Contextual user research methods for eliciting user experience insights in workplace studies

Contextual user research methods for eliciting user experience insights in workplace studies

Maral Babapour
Division Design & Human Factors, Chalmers University of Technology
Institute of Stress Medicine, Region Västra Götaland
maral@chalmers.se; maral.babapour.chafi@vgregion.se

Antonio Cobaleda-Cordero
Division Design & Human Factors, Chalmers University of Technology
cobaleda@chalmers.se

ABSTRACT

Purpose: The purpose of this paper is to contribute with experiences and reflections on user research methods that we have tested in our studies of users' experiences in office environments.

Theory: Previous workplace studies with qualitative data approaches mainly rely on traditional methods such as interviews and observations. Based on user-centered design research, we outline methods that can be used to facilitate understanding the interrelations between users and their surrounding environment.

Design: Three methods and their variations were applied in different case studies to facilitate understanding of user experiences in office environments: (i) spatial walkthroughs, (ii) card sorting, and (iii) experience curve mapping.

Findings: Spatial walkthroughs were more immersive and provided most insights on the actual context with respect to spatial design qualities. The card sorting enabled exploring user experiences with respect to predetermined aspects. The experience curve mapping enabled understanding the temporal aspects of the user experience. The latter two methods were less immersive and less disruptive in the organisational context than the spatial walkthroughs. The flexibility of these methods allows for tailoring the application depending on the purpose of the workplace studies. We recommend using a combination of these methods to capture a more holistic understanding of user experiences and improving the workspace design to better fit the users.

Originality: The outlined methods required user involvement and participation and provided insights for making evidence-based recommendations for designing or redesigning office environments that fit users' needs and preferences.

Keywords

User research; Qualitative methods; Workspace design; Office evaluations; User involvement

1 INTRODUCTION

New ways of organising work and using resources in office environments such as implementation of Flexible Offices are being increasingly implemented in organisations worldwide. These implementations take place amidst larger societal transitions such as the need to mitigate negative

environmental impacts coupled with consumption of goods and energy, as well as technological changes such as the prevalence of portable computing devices and cloud services in people's everyday life. However, research results on the outcomes and implications of relocating to flexible offices show challenges in terms of satisfaction with workspaces and perceived performance (see the literature review by Engelen et al., 2019). This is reported to be due to unassigned workstations and lack of privacy (Morrison and Macky, 2017), and poor ergonomics and mismatches with employees' needs and preferences (e.g. Babapour, 2019a). This highlights that design of such new and flexible offices is often inadequate due to a limited understanding and anticipation of needs and preferences of employees as users of these workplaces.

While there are many works in the workplace research field that address how office environments impact employees (de Croon et al., 2005), there is a wider gap in aiding workplace designers when exploring, creating, evaluating or further developing office solutions from a user-centred design perspective. The study of user experience requires a more holistic approach to gain a more in-depth understanding of users' complex and multidimensional experiences (Desmet, 2003; Law, 2011). In the context of offices, user satisfaction have been addressed with respect to a set of factors such as thermal comfort, air quality, or noise control (Minyoung et al., 2019). However, focusing on general satisfaction with these factors does not suffice for understanding users' experiences in flexible offices since use preferences and actual usage patterns vary considerably among office users (Babapour 2019a; Cobaleda-Cordero, 2019). In contexts other than office environments, qualitative contextual inquiries are recommended to elicit rich user experience data and understand conditions of users' activities in actual real-world situations e.g. with regards consumer products or interaction design (Forlizzi, 2008; Nardi, 1996). However, use of qualitative methods for the study of user experiences in office environments is limited. Therefore, we focus on providing an overview of methods that can lead to a better understanding of users and their use situations, and finding more fitting workplace designs.

The aim of this paper is to contribute with experiences and reflections on user research methods that we have tested in our studies of users' experiences in flexible offices. Specifically, three methods are outlined in the next section. For each of the methods, a theoretical background is provided, followed by the application of the method and its variations in our studies, as well as a reflection on insights that we acquired by using the method. In the discussions, we compare the methods in order to help workplace researchers and designers in choosing between the methods.

2 USER RESEARCH METHODS APPLIED IN WORKPLACE STUDIES

We have applied a variety of qualitative and ethnographic methods for conducting contextual inquiries motivated by the user-centred design perspective. These methods were all used in the context of flexible offices, and in different case studies, each of which with unique research designs. Therefore, each method is outlined with a background, followed by the specificities of its application in our studies, and reflections on the method application.

2.1 Spatial walkthroughs and annotations on architectural drawings

Background – This method is inspired by "cognitive walkthrough" which is used to evaluate whether a system is aligned with how users process tasks (cf. Martin et al. 2012; Polson et al. 1992). Similar to cognitive walkthroughs, a spatial walkthrough evaluates how users understand

spatial characteristics of the environments, whether the environment is easy to use, and whether the environment helps employees to achieve their goals. This method has advantages over occupancy studies that mainly show usage of spaces, rather than allowing for understanding users' motives and reasons behind their workspace preferences. An alternative walkthrough is using architectural drawings as a mediating tool in interviews, encouraging the participants to mark their workspace preferences and comment on the drawings. What follows is the application of variations of spatial walkthroughs in studies on office environments.

Application – We have used three variations of the spatial walkthroughs in our case studies of Flexible Offices to understand users' needs and preferences, and analyse the design of the physical work environment:

- In-situ walkthroughs with post-it notes (Figure 1A) – The participants marked their usage preferences and non-preferences and their motives on post-it notes during the walkthroughs around their flexible office. This application was conducted with pairs of participants in a series of workshops to identify areas of improvement.
- In-situ walkthroughs with architectural drawings (Figure 1B) – An architectural drawing was provided for each participant for marking and motivating their preferences during a walkthrough around the offices. This application was conducted with 3-7 participants prior to a focus group interview, and was analysed as a complementary data to the interviews.
- "Offline" walkthroughs (Figure 1C) – This involved going through an architectural drawing during individual interviews with employees who were asked to mark their preferences and elaborate of their experiences.

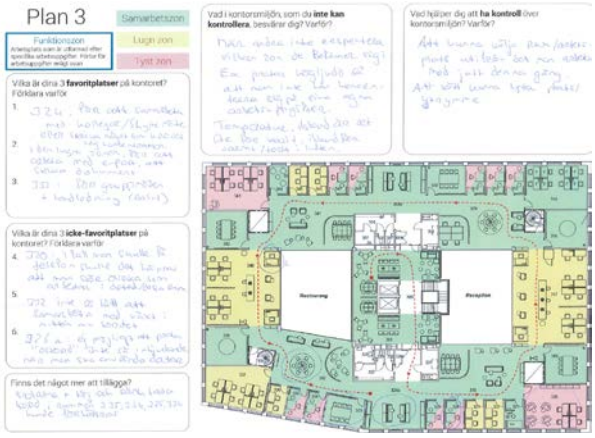
Insights – Application of these methods allowed for understanding users' (non-)preferences (Figure 1D), and identifying successful and sub-optimal features in the design of the studied offices. This covered both architectural aspects and design of furniture and office products. Putting the results together allowed for capturing similar and/or dissimilar preferences among employees, identifying conflicting needs of some employees, and generally underused spaces.

The findings facilitated formulating evidence-based recommendations for re-design of the studied cases. In addition, the methods were appreciated among the participants as it triggered reflections on their workspace choices: "*It was very interesting to take the drawing and reflect; do I feel well and thrive here or not? And why? I haven't actually thought about this before. I have only gone around and wondered why I don't like it here. I have just taken or disregarded the different spots without stopping and thinking why*".

Figure 1. A: In-situ walkthroughs with post-it notes; B: In-situ walkthroughs with architectural drawings; C: “Offline” walkthroughs with annotations on architectural drawings; D: Synthesis of walkthroughs in one of the case studies showing preferences and non-preferences, as well as overlapping and at times conflicting preferences among the different participants.

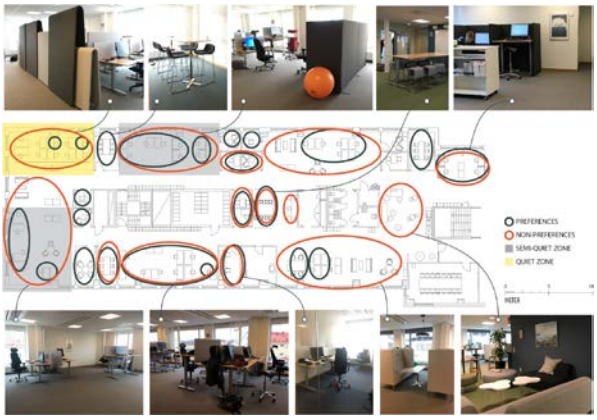
A

B



C

DD



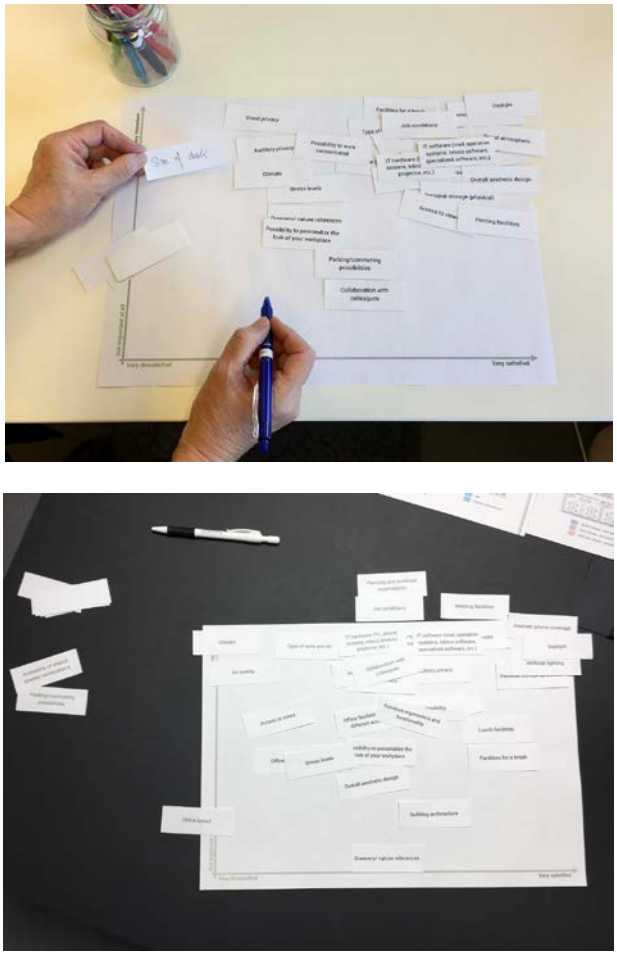
2.2 Card sorting

Background – The Card sorting method is used to understand users' mental models about the information architecture of a product, software or website, and gather their feedback (Spencer, 2009). Users are requested to organise cards with a piece of content or functionalities into groups. Patterns on how the information is expected to be found can be identified and used later for usability improvements (Nurmuliani et al. 2004). There are two modalities of card sorting: 'open card sorting' and 'closed card sorting', that differ in the ability that the user has (or not) to define the content of the cards and the categories for clustering them (Paul, 2008). Traditionally, the outcome of card-sorting method is a representation of how users expect to find the information architecture of a product, software or website. The method presented here shares the focus on user experience and adopts the fundamental principle of sorting cards, but with the aim of understanding users' preferences and workplace ideals rather than usability issues. In the context

of office environments, card sorting can be used to elicit insights on how close the office environment is to users' ideal, as well as the circumstances that motivate such perceptions.

Application – Card sorting was used as mediation tool in interviews (Cobaleda-Cordero et al., 2020). The participants were introduced to a biaxial chart; visualising levels of satisfaction and importance (Figure 2). Next, the participants were provided with a series of cards predefined themes one by one. The predefined themes covered the spatial qualities of the office environment such as daylight, thermal comfort or visual privacy, and contextual variables such as job conditions, social environment, etc. The participants were then was asked to sort the cards on the chart while motivating their decisions. Once all the pre-set cards were sorted, the participants were given the opportunity to add extra themes on blank cards to the chart in order to bring up themes that were deemed important but were not addressed. Our application of the card-sorting method can be seen both as a 'closed card sorting' with predefined themes, and a semi-open card sorting' where participants being able to add their own cards.

Figure 2. Examples of how the participants sorted the cards with respect to satisfaction and importance.



Insights – This method enabled mapping how and why diverse variables in the work environment are considered satisfactory and important from the users' viewpoints. In addition, comparisons between participants allowed for distinguishing general patterns. Other insights about the use of this method were: (i) the data collection benefits from opening a dialogue space

where participants can provide rich insights even on themes that were not considered a priori, but surface as relevant and worth to be proposed to following participants; (ii) handing-in the cards one by one to the participants proved to be an effective manner to help them focus on concrete themes, while allowing them to freely reflect and elaborate on how each of those themes related to their daily office experiences, (iii) the biaxial chart used for sorting was more efficient in our pilot tests than a four-quadrant chart, since the latter chart took longer for the participants to familiarise with it and sort each card, and (iv) the exact placement of the cards on the chart is not crucial in the card-sorting method, since demanding high accuracy in sorting would shift the focus from sharing insights to making the precise placement and would be more time-consuming. In summary, the main benefit of using this method is that it triggers discussions on a diversity of themes and facilitates eliciting user experience data in workplace studies.

2.3 Experience curve

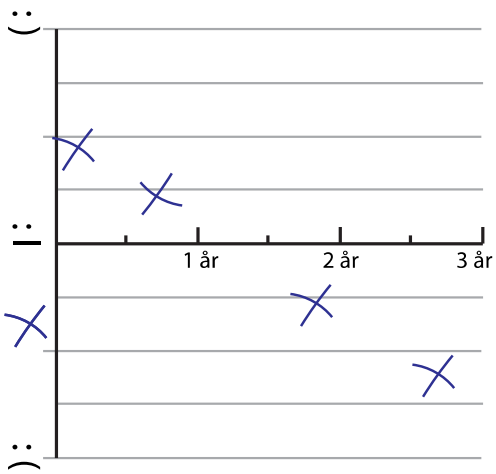
Background – Experience curves are commonly used in the field of interaction design to understand temporal changes in users' experiences of interacting with computers (Kujala et al., 2011). The method aims at "*assisting users in retrospectively reporting how and why their experience with a product has changed over time*" (ibid.). This method enables determining the quality of long-term user experience and the influences that improve user experience over time or cause it to deteriorate. In the context of flexible of offices, this method can be used in two ways: (i) to understand the office users' experience over a pre-determined and relatively short duration e.g. a day or a week, and (ii) to explore the employees' long-term experience post-relocation.

Application – The two variations of the Experience curve mapping were used in our case studies of Flexible Offices to capture temporal changes in employees' experiences (Figure 3):

- Daily experiences – The participants were asked to map their activities in a typical workday, and mark their experience with respect to pleasurability in the workspaces. They were then asked to explain reasons behind "peaks and valleys" of their experience curves, and suggest improvements that could potentially resolve the negative experiences. This method was used during focus group interviews with 3-7 participants.
- Long-term experiences – In individual interviews, the participants were asked to mark changes in their experience in a Flexible Office over a 3-year period post-relocation. They were then encouraged to reflect on the "peaks and valleys" of their experience curves and highlight the events that were the tuning points in their experiences.

Insights – The experience mapping encouraged the participants to elaborate on personal experiences related to specific time frames. In both versions, the participants had to take some minutes to recall and reflect on their activities and experience. The first variation was used in interviews with two participants where they had to explain to each other what they did and how they experienced the workspaces. This interaction facilitated more discussions and allowed the participants to build on each other's reflections. The long-term version of the method helped capturing hedonic adaptations and the adoption processes over time (Babapour, 2019b).

Figure 3. Left: Experience curve, mapping a typical day's activities and the users' experience coupled with the specific activity in relation to the office; Right: an example of the user experience mapping over a longer timeframe post-relocation.



3 DISCUSSIONS AND CONCLUDING REMARKS

To facilitate the understanding of office users' experiences in relation to the design of workplaces, we outlined three types of user-centred research methods that we have applied in case studies on Flexible Offices. It is important to highlight the extensive research on methods and tools for user studies within the fields of Product Design and Human-Computer-Interaction (for further reading, see Interaction Design Foundation, 2020). This paper exemplifies the application of such methods in workplace studies for the first time, and provides insights on methodological implications for eliciting rich data on users' experiences of their workplaces. The following discussion addresses the relevance of these methods to practice, and provides a comparison of the methods.

The outlined methods provided rich qualitative data in all of the applications, and guidance for re-design of the studied offices. Previous research on flexible offices emphasise on making incremental improvements post-relation (Babapour, 2019b), and that a lack of improvements can lead to prolonged dissatisfaction, frustrations and a feeling of resignation among employees (Babapour, Karlsson & Osvalder, 2018). The outlined methods can support organisations in finding ways to mitigate the unintended mismatches and problems that surface after relocation to Flexible Offices. We argue that these methods can also be used before relocation to facilitate needs and activity analysis, and enable an evidence-based and participative design process.

To inform choice of methods when studying users' experiences in office environments, it is important to consider the different characteristics of the outlined methods. It is important to note that these methods complement each other in understanding users' situations, eliciting users' needs, and exploring potential future solutions, and therefore should be used together. The major differences between the outlined methods are in terms of:

- the extent to which the actual context is brought up in the elicited insights,

- the extent to which the participants are immersed in the actual context,
- the temporality that the method covers: whether it relates to anticipated experiences in future, ongoing momentary ones, episodic everyday experiences or cumulative experiences over time (cf. Roto et al., 2011),
- the extent to which the participants are guided or encouraged to be spontaneous, and
- how disruptive the application of the method is with respect to the surrounding activities in the organisation.

Spatial walkthroughs provide concrete, direct, and open feedback about the studied office environment, encouraging the participants to elaborate on their preferences and daily experiences. The method allows for spontaneity and a complete immersion in the workspaces. It triggers recollection of emotional reactions and reflections related to their momentary experience of walking through the office and the episodic experiences of having recently used the workspaces. The variation with blueprint annotations is however less immersive, relying on the ability of the participant to interpret the floor plan and recall experiences without the sensorial stimuli of the actual context. This entails a more filtered impression of the office context. Therefore, it is more likely to elicit information on cumulative experiences. The immersive walkthrough is however to some extent disruptive, as it can distract other employees, while the non-immersive version can avoid disruptions. Nonetheless, the method allows for eliciting user experience data and provides insights for further improvement of office environments.

Card sorting is less explorative than the walk-throughs as it departs from a set cards with predefined themes to reflect and discuss. As a result, the actual context of the office somehow shifts to the background, with less immersion and disruption than the walkthroughs. Thus, the temporal aspect is mostly focused on the cumulative experience of the participants as longer-term users of the studied offices. We recommend card sorting for studies aiming to collect rich user experience data on predetermined aspects of the office environment known to influence users' experience. This method can also be used to understand users' preferences in terms of these predetermined aspects in the design process as it is not dependant on the actual context.

Experience mapping can be labelled as a temporal walk-through during which the participants are encouraged to elaborate on personal experiences related to specific time frames. The method is explorative with direct and open feedback from the participants. Revisiting a time frame instead of a physical setting involves less immersion in the actual context. It is important to highlight that this method captures what remains important from the users' viewpoint about their experiences. If the purpose of a study is to ensure in-situ accuracy of experiences and avoid retrieval failure, we recommend using diary methods instead, for example the quantitative application of the diary method by Gerdenitsch and colleagues (2018). Nonetheless, the experience mapping method provided insights on what users found important about their office environments. The choice of the timeframe for application of the method should be tailored based on the purpose of studies

The main essence of the outlined methods is ***Participation*** and a high degree of user involvement, as they mainly rely on personal experiences, perceptions, affective states, needs, etc. Previous studies on Flexible Offices emphasise on the role of employee participation during the design process (Babapour, 2019a; Rolfö, 2018), but studies on how to ensure and facilitate this process are limited. The methods outlined in this paper facilitate employee involvement both during the design process and for incremental adjustments post-relocation.

To conclude, three user research methods and their variations were outlined in this paper that enable capturing different aspects of user experience with respect to their office environments. Therefore, a multi-method approach for triangulation of data is recommended to capture a holistic and thorough understanding of the office user experience. The outlined methods facilitate employee involvement and participation, and provide opportunities for making experience- and evidence-based recommendations for (re-)design of workplaces.

REFERENCES

Babapour, M., Harder, M. and Bodin Danielsson, C. (2020), "Workspace preferences and non-preferences in Activity-based Flexible Offices: Two case studies", Applied Ergonomics, Vol. 83 No. doi:10.1016/j.apergo.2019.102971.

Babapour, M. (2019a), *The Quest for the Room of Requirement Why Some Activity-Based Flexible Offices Work While Others Do Not.* Chalmers University of Technology, available at: https://research.chalmers.se/en/publication/509482.

Babapour, M. (2019b), "From fading novelty effects to emergent appreciation of Activity-based Flexible Offices: Comparing the individual, organisational and spatial adaptations in two case organisations", *Applied Ergonomics*, Vol. 81 No. October 2018, p. 102877.

Babapour, M., Karlsson, M. and Osvalder, A.-L. (2018), "Appropriation of an Activity-based Flexible Office in daily work", *Nordic Journal of Working Life Studies*, Vol. 8 No. S3, pp. 71–94. doi: 10.18291/njwls.v8iS3.105277.

Cobaleda-Cordero, A. (2019), *Office Landscapes for Well-Being*, Chalmers University of Technology, available at: https://research.chalmers.se/en/publication/512797.

Cobaleda-Cordero, A., Babapour, M. and Karlsson, M. (2020), "Flexible office, flexible working? A post-relocation study on how and why university employees use a combi-office for their activities at hand", *International Journal of Human Factors and Ergonomics*, Vol. 7 No. 1, pp. 26–54.

de Croon, E.M., Sluiter, J.K., Kuijer, P.P.F.M. and Frings-Dresen, M.H.W. (2005), "The effect of office concepts on worker health and performance: A systematic review of the literature", *Ergonomics*, Vol. 48 No. 2, pp. 119–134.

Desmet, P. (2003), "A Multilayered Model of Product Emotions", *The Design Journal*, Vol. 6 No. 2, pp. 4–13.

Engelen, L., Chau, J., Young, S., Mackey, M., Jeyapalan, D. and Bauman, A. (2019), "Is activity-based working impacting health, work performance and perceptions? A systematic review", *Building Research & Information*, Vol. 47 No. 4, pp. 468–479.

Forlizzi, J. (2008). The product ecology: Understanding social product use and supporting design culture. *International Journal of Design*, *2*(1).

Gerdenitsch, C., Korunka, C. and Hertel, G. (2018), "Need–Supply Fit in an Activity-Based Flexible Office: A Longitudinal Study During Relocation", *Environment and Behavior*, Vol. 50 No. 3, pp. 273–297.

Interaction Design Foundation. (2020), “The encycopedia of Human-Computer Interaction”, available at: https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed (accessed 1 June 2020).

Kujala, S., Roto, V., Väänänen-Vainio-Mattila, K., Karapanos, E. and Sinnelä, A. (2011), “UX Curve: A method for evaluating long-term user experience”, *Interacting with Computers*, Vol. 23 No. 5, pp. 473–483.

Law, E.L.C. (2011), “The measurability and predictability of user experience”, Proceedings of the 2011 SIGCHI Symposium on Engineering Interactive Computing Systems, EICS 2011, pp. 1–9.

Martin, B., Hanington, B., & Hanington, B. M. (2012). Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions. Rockport Publishers.

Minyoung, K., Hilde, R. and Andy, V.D.D. (2019), “User-focused office renovation: a review into user satisfaction and the potential for improvement”, *Property Management*, Vol. 37 No. 4, pp. 470–489.

Morrison, R.L. and Macky, K.A. (2017), “The demands and resources arising from shared office spaces”, *Applied Ergonomics*, Vol. 60, pp. 103–115.

Nardi, B. A. (1996). *Context and Consciousness: Activity Theory and Human-computer Interaction*. MIT Press.

Nurmuliani, N., Zowghi, D., & Williams, S. P. (2004). Using card sorting technique to classify requirements change. In *Proceedings. 12th IEEE International Requirements Engineering Conference, 2004.* (pp. 240-248). IEEE.

Paul, C.L. (2008), “A Modified Delphi Approach to a New Card Sorting Methodology”, *Journal of Usability Studies*, Vol. 4 No. 1, pp. 7–30.

Polson, P. G., Lewis, C., Rieman, J., & Wharton, C. (1992). Cognitive walkthroughs: a method for theory-based evaluation of user interfaces. *International Journal of man-machine studies*, *36*(5), 741-7733

Rolfö, L.V. (2018), “Relocation to an activity-based flexible office – Design processes and outcomes”, *Applied Ergonomics*, Elsevier, Vol. 73 No. November, pp. 141–150.

Roto, V., Vermeeren, A., Väänänen-Vainio-Mattila, K., & Law, E. (2011). User experience evaluation–which method to choose? In *IFIP Conference on Human-Computer Interaction* (pp. 714–715).

Spencer, D. (2009). Card sorting: Designing usable categories. Rosenfeld Media.